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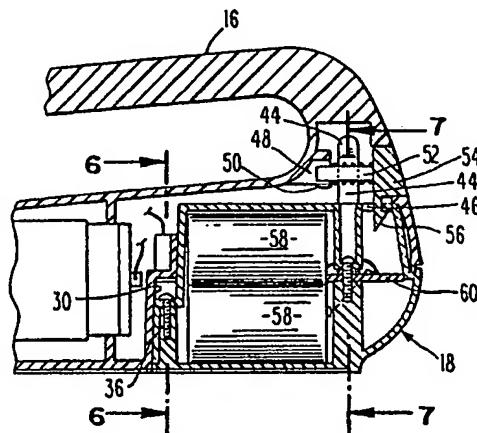
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## (54) Removable battery pack for electric appliance

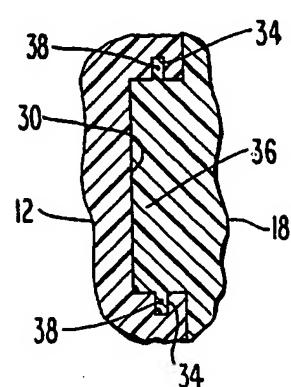
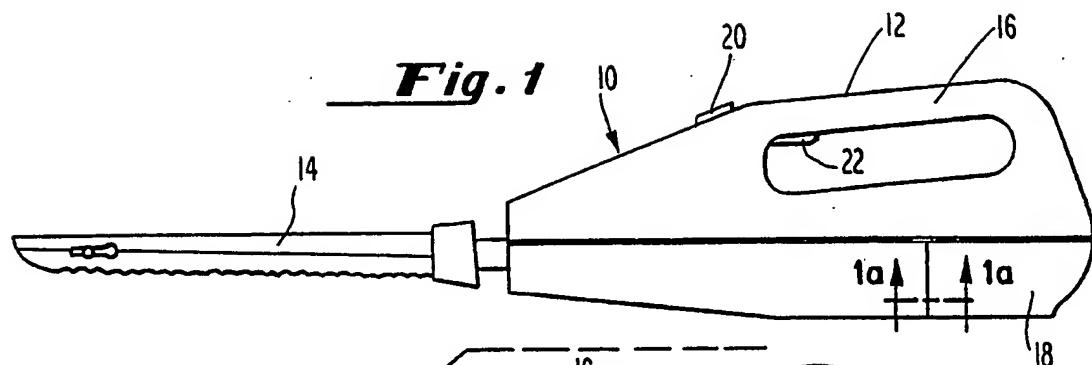
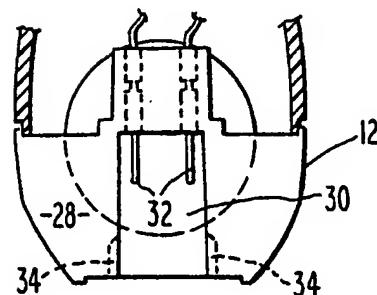
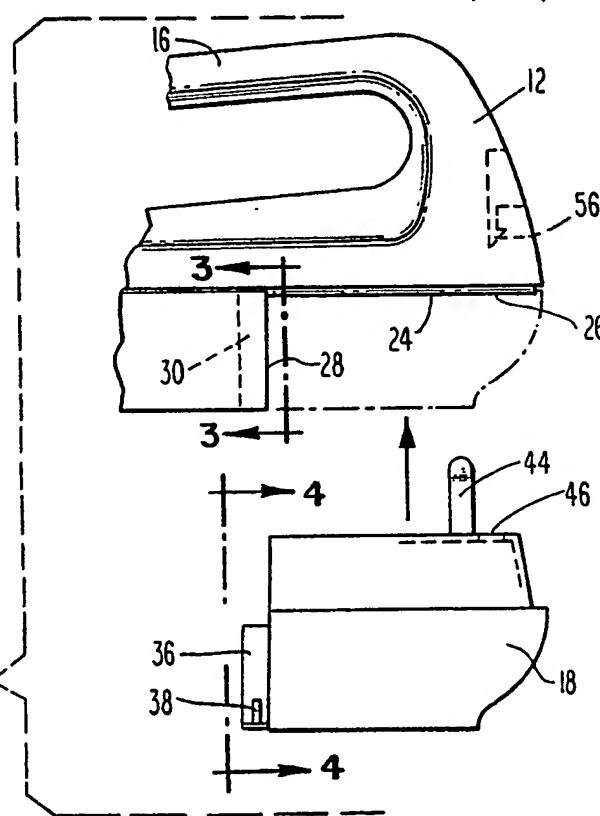
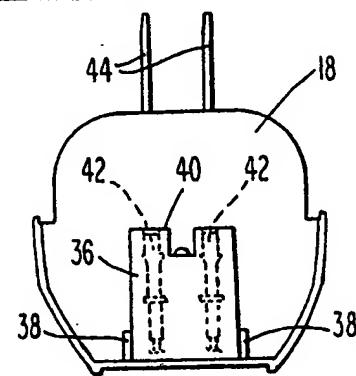
(57) An electric appliance has a  
removable battery pack section (18)  
having a front end shaped to slide  
dovetail fashion up into the appliance  
housing and a spring biased latch (54)  
which holds up the rear of the section.  
Sets of parallel contacts for discharging  
and charging are oriented in the  
direction of the installing movement of  
the section into the housing.

Fig. 5



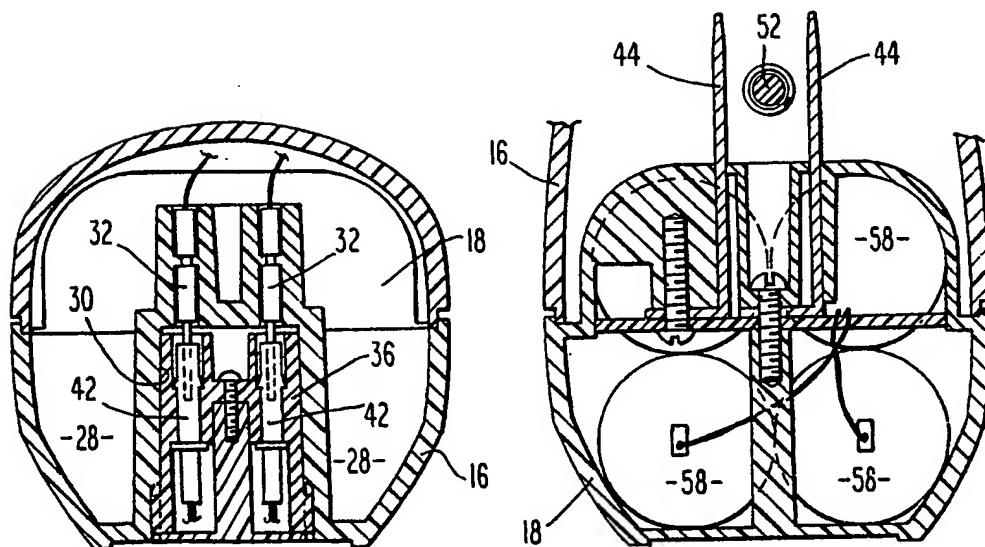
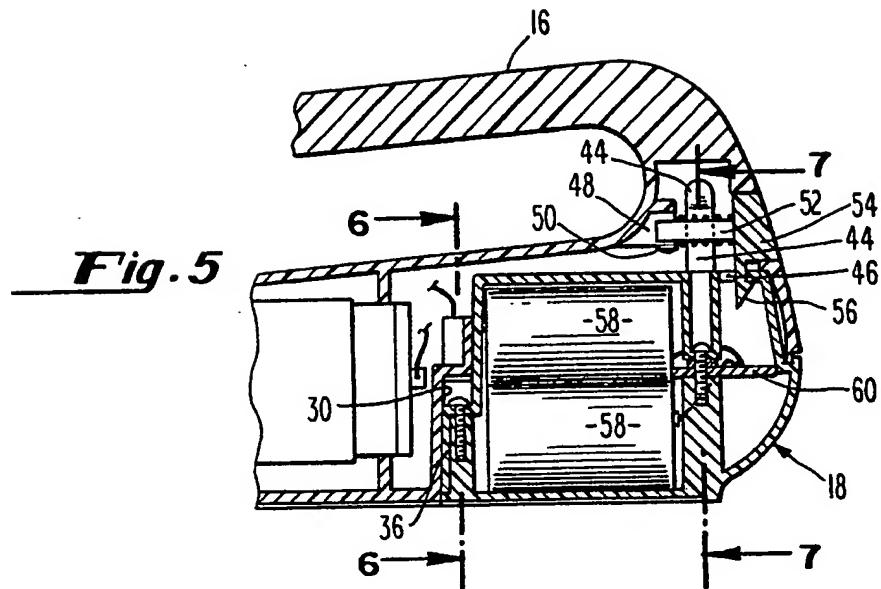
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Fig. 1Fig. 1aFig. 2Fig. 3Fig. 4

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**Fig. 6**

**Fig. 7**

## SPECIFICATION

## Removable battery pack for electric appliance

5 This invention relates to an electrical appliance in which a battery pack supplying the power may be removed from the appliance and plugged into a conventional AC wall receptacle for recharging.

The prior art evidences attempts to provide appliances such as electric razors with removable battery packs which are rechargeable by plugging them into wall receptacles. An example is disclosed in Fleckenstein et al, United States Patent 3,281,636 issued October 25, 1963. One of the problems with 10 earlier such appliances is that the attachment between the body of the appliance and the battery pack has been dependent on the frictional engagement of the electric contacts of the appliance and battery pack themselves so that over time and with wear, the 15 securement of the two parts together has become 20 loose and unreliable.

In United States Patent 3,757,194 which issued on September 4, 1973 to Weber et al, a battery pack section is slid into its place in the appliance housing. 25 This unit is not provided with separate sets of contacts for discharging into the appliance and for insertion into a wall plug for recharging, however.

A more recent United States Patent 4,084,123, which issued on April 11, 1978 to Lineback et al, 30 provides a battery charger having a single set of contacts which may be used both for recharging and discharging into the appliance, but such units require an expensive conversion switch and complicated circuitry.

35 Under the present invention, the battery pack circuit is kept simple by virtue of separate sets of contacts for charging the battery pack and discharging the pack into the appliance. These sets of contacts are parallel to each other, with the result 40 that the vertical sliding of the pack into its place in either the appliance or the AC wall plug does not involve the structural interference of the sets of contacts with each other. Moreover, this vertical sliding into the appliance is made secure by a tongue 45 and groove interfit between parts at one end of the battery pack and a secure spring-latching mechanism at the other end.

Figure 1 is a side elevation view of an appliance embodying the invention;

50 Figure 1a is a fragmentary sectional view taken on line 1a - 1a of Figure 1;

Figure 2 is a fragmentary enlarged view showing in solid lines the battery pack removed and in phantom lines the battery pack in place;

55 Figure 3 is a fragmentary sectional view taken on line 3-3 of Figure 2;

Figure 4 is a sectional view taken on line 4-4 of Figure 2;

Figure 5 is a fragmentary enlarged sectional view 60 of the rear end of the appliance showing the battery pack installed;

Figure 6 is an enlarged sectional view taken on line 6-6 of Figure 5; and

65 Figure 7 is an enlarged sectional view taken on line 7-7 of Figure 5.

Referring more specifically to the drawings, an electric carving knife embodying the invention is generally designated 10 in Figure 1. It comprises a smooth housing 12 having an opening in the front 70 end receiving dual reciprocable blades 14.

The housing 12 includes a handle portion 16 and a lower removable section 18. An operating button 20 is provided within a thumb's reach of the handle, and a safety block button 22 is provided as disclosed 75 in United States Patent 3,358,108 which issued December 12, 1967 to Hanson. The main section of the housing 12 encloses the knife operating motor and the removable section 18 encloses a rechargeable battery pack.

80 With the section 18 removed, a recess 24 is created having a horizontal margin 26 and a vertical wall 28 (Figure 2). The vertical wall is formed with a vertical cavity 30 (Figure 2). At the upper end of the cavity, bare motor contacts 32 extend downwardly. The 85 sidewalls of the cavity are formed with partial grooves 34. The contacts 32 are connected directly to the motor through the switch button 20 in a conventional manner.

The removable section 18 (Figure 4) is formed with 90 a vertical projection 36 adapted to fit into the recess 30 and having ridges 38 on its opposite vertical sidewalls. The upper end 40 of the projection is provided with female contacts 42. Extending upwardly from the removable section 18 are the AC 95 charge contacts 44 adapted to be inserted into a conventional wall receptacle. The upper surface of the section 18 is formed adjacent its rearward end with a latch opening 46 (Figures 2, 5). The interior of the handle portion 16 of the housing is formed with a 100 trough-shaped boss 48 which is closed on its lower end by a strap 50, the trough and the strap defining an opening for the spring biased stem 52 of a plunger-like latch having a head 54 with a downward latching finger 56.

105 The sectional view of Figure 5 shows the removable section 18 including batteries 58. These are connected appropriately through a printed circuit board 60, mounted in the section 18 and connected to both the female discharge contacts 42 and the AC 110 charging contacts 44.

In use, the removable section 18 may be removed from the rest of the knife and the charging contacts 44 inserted in the conventional wall receptacle for recharging. After a suitable time, the removable 115 section 18 may be reinstalled in the knife by placing the projection 36 in alignment with the cavity 30 and vertically raising the section 18 so that the ribs 38 fit into the grooves 34 and the latching finger 56 snaps into the opening 46 in the removable section. This 120 securely holds the section in place, even after prolonged usage and numerous installations and removals thereof.

## CLAIMS

125 1. A battery powered handheld electric appliance, comprising: a smooth housing (12), a lower section (18) of the housing enclosing a rechargeable battery pack (58), the lower section being removable 130 to leave a recess (24) having a vertical (28) and a

horizontal wall (26), motor means for driving an appliance disposed in the housing spaced from the lower section, vertically extending and engaging interconnecting electrical means (32, 42) in the

5 removable section and the housing adjacent the recess and releasably connecting the battery pack and the motor, the rear of the housing above the recess including manually operable latch means (54), the removable section having a front vertical

10 wall with a forward vertical projection (36) having first interfitting means (34) on the sides thereof, the vertical wall of the recess having a vertical cavity (30) complementing the vertical projection, the cavity having second interfitting means (34) in its sidewalls

15 to slidily accommodate the first interfitting means, and latch-engaging means (46) at the rear end of the removable lower section, the latch and the interfitting means in cooperation keeping the removable section stored snugly up in the recess.

20 2. An appliance as claimed in Claim 1, wherein the latch is a plunger element having a stem (52) mounted in a base in the housing and including a hook (56) latchingly extending into an opening (46) in the top of the removable section, and an operator

25 button (54) in an opening in a rear surface of the housing and having an end surface flush with the surface of the housing.

3. An appliance as claimed in Claim 2, further comprising a pair of upwardly directed, spaced

30 battery charging contacts (44) mounted on the removable section, said charging contacts extending up into the housing in a space above the removable section when the removable section is stored in the recess, the battery charging contacts being disposed

35 on opposite sides of the plunger stem.

4. An appliance as claimed in Claim 1, wherein the first interfitting means are outward ribs and the second interfitting means are grooves.

5. A battery powered hand held electric ap-

40 pliance, substantially as herein described with reference to the accompanying drawings.